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ABSTRACT

To test the hypothesis that self-esteem correlates significantly with both achievement and I.Q. in the same direction, that is, either positively or negatively, 318 eighth grade and 478 fifth grade students were randomly selected. Stanford Achievement Tests and the Otis-Lennon Mental Abilities Test were administered to obtain the respective achievement and I.Q. scores. The Coopersmith Self-Esteem Inventory was used to measure the self-esteem of the fifth graders, while a comparable test was developed and validated by the author for the eighth graders. Factor analysis was used to determine whether a significant positive relationship existed between the three variables. I.Q correlated significantly with all the achievement subtests for the fifth graders, as expected, but not with self-esteem. Because self-esteem correlated positively with reading achievement and not I.Q., the hypothesis was rejected for this group. It was again rejected for the eighth graders--I.Q. correlated with only two of the math subtests and self-esteem correlated with none. However, a comparison between the correlation and the rotated factor matrices for eighth graders showed that the original problem and hypothesis were not as simple to resolve as it might appear; although I.Q. did not correlate with self-esteem, it had significant loadings on both factors designated as "ability" and "self-esteem." Math computation had a higher positive loading on the self-esteem factor than the ability factor. With this one exception, results indicated that I.Q. and self-esteem are not related generally. (CP)

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RELATIONSHIPS BETWEEN SELF-ESTEEM, ACHIEVEMENT, AND I.Q. MEASURES OF ELEMENTARY AND SECONDARY STUDENTS

BACKGROUND

Several recent studies have indicated that there is a significant relationship between a student's achievement in school and his self-concept. Jackson stated that, "...the young child who has a good self-image learns to read easily. One with equal intelligence but a poor self-image is plagued by difficulties" (Jackson, 1972). Frerichs, who studied inner-city sixth graders, found a positive relationship between self-esteem and school success in terms of reading achievement and GPA. He found no differences in self-esteem between high and low I.Q. groups and concluded that I.Q. scores were not visible indicators relating to self-esteem, whereas, the roles of reading and teacher marks were clearly evident throughout the school (Frerichs, 1971). A study of sophomores in a major university discovered that identity rating, self-concept of ability, self-expression, and scholastic aptitude "...were positively associated with each other." Self-concept of ability was the most effective and consistent predictor of achievement, even better than scholastic aptitude (Jones and Grieneeks, 1970). When students ranked their math achievement with others in their class, these self-esteem measures correlated positively with self, peer, and teacher rankings, and all correlated with achievement in math. Self-concept in this study emphasized visible indicators of achievement in class due to "...the result of the increased number of opportunities to observe each pupil's performance in arithmetic" (Peper and Chansky, 1970).

From the above studies and others like them, it was rather apparent that

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self-perception was a predictor of academic achievement, but it was reported in a respectable study that there was a negative relationship between self-image and (1) GPA or (2) number of credits earned for Blacks and Whites. Although the mean I.Q. of Blacks was significantly lower than both the Jewish and White (non-Jewish) groups, Blacks had a significantly higher self-image mean than Whites, but not Jewish. Thus, I.Q. correlated negatively with self-concept (Powers, et al, 1970).

The study by Frerichs mentioned previously determined that I.Q. was not related to self-esteem. Considering that I.Q. correlates significantly with socio-economic status (SES), Frerichs' finding is in direct contrast with Trowbridge, who reported in 1972 that low SES groups have significantly higher self-esteem scores. She hypothesized that an I.Q./self-concept relationship might be the explanation of differences caused by the SES factor, and the "...higher self-concept of low SES students exists at all I.Q. levels..." (Trowbridge, 1972).

Because I.Q. has been found to correlate positively with achievement in studies which are too numerous to mention, it hardly seems plausible that self-concept can correlate positively with achievement as indicated in the above studies and negatively or not at all with I.Q.

PURPOSE

The present study attempted to determine whether there are significant relationships, and in the same directions, between self-esteem, achievement, and I.Q. in both elementary and secondary schools. It is hypothesized that self-esteem will correlate significantly with both achievement and I.Q. in the same direction, i.e., either positively or negatively.

If the hypothesis is accepted, then the mathematical transitive

relationship is upheld:

If a R b and b R c, then a R c

a=I.Q.
b=achievement
c=self-esteem

The R symbol indicates a continuing relationship which, in this case, must be either positive or negative to accept the hypothesis. If the hypothesis is rejected, then perhaps Frerichs was right, i.e., that I.Q. and achievement relate to self-concept in different ways, if at all.

DESIGN AND METHODOLOGY

Three medium-sized school systems in one southwestern state were selected for this study because they were very representative of the urban-rural mixture of the state. Random samples selected from these systems were 318 eighth grade math students and 478 fifth graders. Stanford Achievement Tests and Otis-Lennon Mental Abilities Test were administered to obtain the respective achievement and I.Q. scores.

The "Coopersmith Self-Esteem Inventory" (CSEI) was used to measure the self-esteem of fifth graders. It was reported to have a test-retest reliability coefficient of .88 over a five-week interval. Using Coopersmith's key, a total score was obtained for each student (Coopersmith, 1959).

In an attempt to develop a secondary level test which would be comparable to the CSEI, the present author used the expert panel approach to begin a new instrument, which was later factor analyzed to form the objectives and questions in Table 1. Items are preceded by their actual numbers on the instrument. Negative signs following questions indicate that "Unlike Me" is the correct response. Although the majority of students answered some negative items (39, 21, 35, 4, 31, 14) as being "Like Me," these items were left as negative because the purpose of the instrument is to indicate a positive self-concept and not the

normal response of students. These "Like Me" responses to negative items seem to reflect peer pressure to conform, rather than to be individualists.

To determine the reliability of the instrument, the test-retest method was rejected because it is inversely related to time span and does not test for the internal consistency of items related to the self-esteem construct. Therefore, the most accurate Kuder-Richardson formula (KR_{20}) was used, and the resulting r_{tt} was equal to .75. Future revisions after extended usage should improve the test and its internal consistency.

To determine whether significant positive relationships existed between self-esteem, achievement, and I.Q., the factor analysis method was used to determine the factors with which each of these variables correlated. A principal component solution and the varimax rotation of the factor matrix were performed. Principal component analysis was used to determine the minimum number of orthogonal factors which accounted for most of the variance in the three variables. The varimax rotation was used to simplify columns (factors) rather than rows (variables) of the factor matrix. The loadings on the resulting orthogonal factors gave the correlations between the variables and the factors.

RESULTS

As indicated in Table 2, Ss were within one standard deviation of average intelligence, and their achievement scores placed them at about the national average also. Table 3 gives the significant correlations between the variables. I.Q. correlated significantly with all the achievement subtests, as expected, but I.Q. did not correlate with self-esteem. Because self-esteem correlated positively with reading achievement and not I.Q., the hypothesis was rejected for fifth grade Ss. Since the analysis of a correlation matrix can be understood best using factor analysis, these results are presented in Table 4. After

limiting eigenvalues to 1.0 or greater, two factors were found. The first was designated the "ability factor" because I.Q. was significantly loaded on that factor, and the second factor was designated the "self-esteem factor" similarly. Reading comprehension and word knowledge correlated significantly with both factors, but arithmetic achievement correlated only with the ability factor.

Eighth grade Ss had a mean I.Q. of 107, and a mean self-concept of 30.6 out of a possible 45. Mean mathematics scores were below average because end-of-year norms on the Stanford Achievement Tests had to be used (See Table 5). Table 6 indicates very few intercorrelations between the variables. I.Q. correlated with only two of the math subtests, and self-esteem correlated with none, therefore, the hypothesis is again rejected.

However, these correlations do not give the total picture, considering the factor analysis loadings in Table 7. Although I.Q. did not correlate with self-esteem, it had significant loadings on both factors, the second of which was considered as the self-esteem factor because of its high positive loading on self-esteem. Mathematics concepts and applications had high positive loadings on the first factor, designated as ability, but math computation had a higher positive correlation with the self-esteem factor than the ability factor. The author noted that many lower ability students scored higher on the computation subtest than they did on the other two subtests.

DISCUSSION

The original problem and hypothesis were not as simple to resolve as it might appear. Correlations between tests do not reflect general factors which all of them might be measuring to some degree. In many cases the loadings of two tests on one factor may be positive and significant, whereas, the tests did not even correlate initially. Therefore, factor analysis methodology is superior in studying R matrix outcomes.

TABLE 1

Item Analysis for Schnee Secondary Self-Esteem Inventory

I. TERMINAL OBJECTIVE - The student demonstrates behaviors which indicate regard for himself as a person of worth and value.

	Percent Responding	
	Like Me	Unlike Me
A. Objective: Chooses own courses of action		
1. I can usually make up my mind about something without asking anyone first.	70	30
10. Someone usually has to tell me what to do. (-)	38	62
19. I seldom do things that I am sorry for later.	49	51
27. I don't care what happens to me. (-)	11	89
33. I can make up my mind and stick to it.	69	31
39. There are many things that I would like to do, but I usually go along with what others want. (-)	73	27
B. Objective: Selects and defends a position		
2. I don't give in easily when I think I'm right.	87	13
11. I have reasons for the things that I do.	89	11
20. If I have something to say, I say it.	55	45
28. I like to debate my ideas.	67	33
34. I think I can help to change things.	70	30
C. Objective: Accepts his perception of himself in general		
3. I would rather be myself than anyone else.	84	16
12. I can take care of myself.	92	8
21. There are many things about myself that I would change if I could. (-)	77	23
29. I can be trusted.	92	8
35. I wish I were younger (older). (-)	57	43
40. I think I'm doing O.K.	80	20
43. I'm not ashamed of what I am.	89	11
D. Objective: Accepts failure and success		
4. I really get upset when I fail at anything. (-)	61	39
13. I don't make a big deal out of being right.	85	15
22. I learn from my mistakes.	90	10
30. When I'm wrong, I like for people to tell me.	84	16
36. When nice things happen to me, it is only good luck and nothing I did to deserve it. (-)	25	75
41. When bad things happen to me, it is usually someone else's fault. (-)	15	85

TABLE 1 (con't)

	Percent Responding	
	Like Me	Unlike Me
II. TERMINAL OBJECTIVE - The student assumes a positive role in interpersonal relationships.		
A. Objective: Understand and accept one another (peers)		
8. I'm easy to like.	82	18
17. People like my ideas.	53	47
25. People often embarrass or hurt me. (-)	34	66
31. Other people are liked better than I am. (-)	60	40
37. My interests are shared by other students.	73	27
42. I have many friends my own age.	84	16
44. I like being with other people.	91	9
45. I try to be friends with another person even if he isn't friendly to me.	77	23
B. Objective: Assumes various roles in goal-oriented groups		
9. I like to be the leader in all activites. (-)	27	73
18. Getting along with others is more important to me than always being first.	92	8
26. I like to share leadership responsibilities with others.	80	20
32. I would rather work with only my close friends in school activities. (-)	45	55
38. I can seldom make other people do the things I want them to do. (-)	50	50
III. TERMINAL OBJECTIVE: Demonstrates behaviors which indicate positive adjustment to the school environment		
A. Objective: Confidence in front of others		
5. I enjoy talking in front of the class.	17	83
14. I don't like to be called on in class. (-)	60	40
B. Objective: Pride in school work		
6. I recheck my school work to make sure that it is neat and correct.	45	55
15. I'm proud of my school work.	63	37
23. I'd be pleased to have examples of my class-work displayed during open house.	43	57
C. Objective: Achieves at highest level possible		
7. I do the best work that I can in class.	85	15
16. I'm not doing as well in school as I'd like.	69	31
24. My school work makes me feel discouraged.	36	64

TABLE 2

Grade Five: Means and Standard Deviations of Variables

	I. Q.	Self-Concept	Word Meaning	Reading Comprehension	Arith. Computation	Arith. Concepts	Arith. Application
Mean	111.2	55.6	50.8	51.3	37.4	58.2	56.0
Stand. Dev.	12.8	10.3	29.0	30.8	22.4	29.4	31.6

TABLE 3

Correlation Matrix: Grade Five

	I. Q.	Self-Concept	Word Meaning	Reading Comprehension	Arith. Computation	Arith. Concepts	Arith. Application
I. Q.			.49**	.64**	.40**	.57**	.49**
Self-Con.			.45**	.31*			
Word Mean.				.79**	.48**	.57**	.48**
Read. Comp.					.40**	.67**	.58**
Arith. Comp.						.43**	.53**
Arith. Con.							.77*
Arith. Applic.							

*Correlation significant at $p < .05$
**Correlation significant at $p < .01$

TABLE 4

Rotated Factor Matrix (Two Factors): Grade Five

	Factor Loadings	
	Ability	Self-Esteem
I. Q.	.739**	.159
Self-Esteem	.046	.932**
Word Knowledge	.633**	.643**
Reading Comprehension	.753**	.477**
Arithmetic Computation	.664**	.099
Arithmetic Concepts	.872**	.082
Arithmetic Applications	.874**	-.041

**Significant at $p < .01$

TABLE 5

Grade Eight: Means and Standard Deviations

	I. Q.	Self-Concept	Math Comp.	Math Concepts	Math Applications
Mean	107.0	30.6	18.6	36.3	37.6
Standard Dev.	10.8	5.7	15.4	23.3	22.8

TABLE 6

Correlation Matrix: Eighth Grade

	I. Q.	Self-Est.	Math Comput.	Math Conc.	Math Applic.
I. Q.			.400*	.478*	
Self-Esteem					
Math Computation					.367*
Math Concepts					.706**
Math Application					

*Correlation significant at $p < .05$
**Correlation significant at $p < .01$

TABLE 7

Rotated Factor Matrix (Two Factors): Grade Eight

	Factor Loadings	
	Ability	Self-Esteem
I. Q.	.550**	.479**
Self-Esteem	-.107	.875**
Math Computation	.417*	.627**
Math Concepts	.881**	.130
Math Applications	.892**	-.000

*Correlation significant at $p < .05$
**Correlation significant at $p < .01$

For fifth grade Ss, factor loadings of variables supported R matrix findings. I.Q. and self-esteem did not correlate, although reading subscales correlated with I.Q. and self-esteem. The rotated factor matrix gave significant loadings for reading on both factors, which were designated as "ability" and "self-esteem." Neither I.Q. nor self-esteem had a significant loading on the factor of the other. It appears that reading achievement might be improved by improving one's self-esteem, and remedial reading may well be an activity for the objective of improving self-esteem. It could be that vocal behavior and word usage are visible indicators relating to self-esteem, but I.Q. and arithmetic achievement are not. This seems to support Frerichs' conclusions.

Eighth grade Ss presented a more difficult problem, even when achievement was limited to mathematics. First, self-esteem did not correlate with I.Q. or math achievement, and I.Q. correlated with math computation and concepts but not applications. However, the related factor matrix gave significant ($p < .01$) loadings for I.Q. on both factors, one of which has a .875 correlation with self-esteem. Math concepts and applications had high loadings (positive correlations) on the factor designated as ability, but math computation had a higher positive loading on the self-esteem factor than the ability factor. In this one case with math computation, the original hypothesis was confirmed, i.e., I.Q., self-esteem, and achievement all correlated positively and significantly. But the other results rejected the hypothesis and provided much evidence that I.Q. and self-esteem are not related generally.

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